BRUKKAROS HYDROPONICS FARMING (PTY) LTD

SCOPING/ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT

This EIA Report is prepared to support Application (APP-001028) for Environmental Clearance Certificate (ECC)

Proposed Construction and operation of Aquaponic Greenhouse Farming with Complete Solar Plant in Keetmanshoop, //Kharas Region, Namibia

BRUKKAROS
Hydroponic Farming (Pty) Ltd
Superior Organic | Locally Grown | Feeding the Nation.

Proposed Construction and Operation of Aquaponic Greenhouse Farming with Complete Solar Plant in Keetmanshoop, //Kharas Region, Namibia

Submitted

To

Ministry of Environment, Forestry and Tourism
Private Bag 13306
Windhoek

On behalf

Of

BRUKKAROS HYDROPONIC FARMING (PTY) LTD
P. O. BOX 1137
KEETMANSHOOP

By

Envirodu Consulting & Training Solutions cc
P. O. Box 4120
Swakopmund

JUNE 2023

KEY SUMMARY

PROJECT TITLE

Proposed Aquaponic Greenhouse Farming with Complete Solar Plant in Keetmanshoop.

PROPONENT

- *Brukkaros Hydroponic Farming (PTY) LTD.*

TARGET ECONOMIC SECTORS

- *Agriculture.*
- *Energy.*

KEY LEGAL INSTRUMENTS

- *Environmental Management Act (No. 7 of 2007) and EIA regulations of 2012.*
- *Aquaculture Act (no. 18 of 2002).*
- *National Renewable Energy Policy (2017).*
- *National Policy on Climate Change for Namibia (2011).*

EIA PROCESS AND TIMELINES

JANUARY – FEBRUARY 2023 (phase I):

- *1 x advert in the Villager Newspaper (27 January 2023).*
- *1 x advert in the Confidante newspaper (27 January 2023).*
- *1 x advert in the Namib Times newspaper (03 February 2023).*
- *1 x advert in the Confidante newspaper (03 February 2023).*
- *Release of BID to registered I & APs (20 February 2023).*
- *Project registration and screening (24 February 2023).*

MARCH-APRIL 2023 (phase II):

- *Public meeting in Keetmanshoop (Multipurpose and Youth Centre Hall, 18 March 2023).*
- *Availability of EIA and EMP Reports to registered I & APs (28 April 2023).*

MAY-JUNE 2023 (phase III):

- *Request for consent letters from relevant authorities (19 May 2023).*
- *Release of Record Decision (August 2023).*

EXECUTIVE SUMMARY

This development activity has been proposed by Brukkaros Hydroponic Farming (Pty) Ltd to construct and operate a state-of-the-art Urban Farm using the Aquaponic and Solar as Climate Resilient Technologies (CRTs) in Keetmanshoop. This will be a multi-trophic Urban Farm with a main focus on drought tolerant crops and livestock varieties including horticulture crops, finfish, shellfish, crayfish and small livestock in Keetmanshoop (Erf. 2290) and will be the first multi-trophic Urban Farm in the //Karas Region, Namibia.

A screening phase was conducted by Envirodu Consulting & Training Solutions CC (ECUTS) and has found Erf. 2290 to be the most suitable site for an Aquaponic Farm development as well as a least environmentally sensitive area.

The EIA has been conducted in accordance with the Namibia's Environmental Management Act (2007), Environmental Assessment Policy requirements and relevant legislations based on environmental Assessments and environmental protection regulations of the Republic of Namibia.

A public participation process which included Interested and Affected Parties (I&AP) and key stakeholders was conducted in accordance with the Environmental Management Act (No. 7 of 2007) and the Environmental Assessment Policy of the Republic of Namibia the potential identified impacts were assessed based on the construction and the operational phases of the project.

Based on the Environmental Management Plan (EMP) and Emergency Response Plan (ERP), the proposed Aquaponic farm will pose less significant and minimal negative environmental and social impacts, and will thus fully contribute to the economy of Keetmanshoop, //Kharas region and Namibia at large through employment creation and livelihood upliftment and thus contributing to poverty reduction and food security.

Consultants recommends that the ECC should be issued provided that the Proponent has prepared a comprehensive EMP to mitigate negative environmental impacts. Finally,

it is also recommended that environmental performance should be monitored regularly as required by submitting Bi-annual Reports. Finally, information requested by the public about the project must be availed to community at a regular basis as the project will be part of the Keetmanshoop community and this request came out strongly during the public consultation process.

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Author(s)	Ms. Naemi Nelumbu (Lead EAP) Mr. Michael Matheus (EAP/Biodiversity)		
Approval	TWALINOHAMBA AKAWA	9 June 2023	

Reviewed by		**Twalinohamba Akawa**
Document First release	31 May 2023	Draft Scoping/Environmental Impact Assessment Report
Review date	06 June 2023	Final Scoping/Environmental Impact Assessment Report

DECLARATION

Consultants declare that they have no links with BRUKKAROS (PTYA0 LTD. Consultants further, declare that they have no business, financial, personal or other interests in the proposed project, application or appeal in respect of which they were appointed other than fair remuneration for the work performed. Therefore, there are no circumstances that would have compromised the objectivity of this assessment and recommendations, thereof.

Ms. Naemi Nelumbu

Michael Ndinomwene Mateus

List of Acronyms

EAP	Environmental Assessment Practitioner
EC	Environmental Commissioner
ECUTS	Envirodu Consulting & Training Solutions
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
I & AP	Interested and Affected Parties
MEFT	Ministry of Environment, Forestry and Tourism

1. Introduction and Background

1.1. Introduction and Background

The Proponent for the proposed Urban Farm is Brukkaros Hydroponic Farming (PTY) LTD. The Proponent intends to construct and operate a state-of-the-art Urban Farm using the Aquaponic and Solar as Climate Resilient Technologies (CRTs). This will be a multi-trophic Urban Farm with a main focus on drought tolerant crops and livestock varieties including horticulture crops, finfish, shellfish, crayfish and small livestock.

Figure 1: Map of the proposed site (Plot Nr 2290) is located along the B1 High-Way at approximately $26^{0}59$”51 S and $18^{0}14$”24 E.

1.2. Receiving Environment

The proposed Aquaponic farm construction site is located at Plot Nr 2290/Rem and directly falls under the Keetmanshoop Town Council Local Authority administration. Plot Nr 2290/Rem is located along the B1 road opposite the Customs offices in Keetmanshoop, //Kharas Region Namibia. The site is presently vacant and the vegetation is mainly composed of grasses, shrubs and few trees.

1.3. Project Motivation, Need and Desirability

The Proponent aspires to become the producer of various horticultural produces and livestock products in //Kharas Region. The current food procurement system in Namibia and associated increase in food prices necessitated the Proponent to divert away from a 'macro'-based to a 'micro'-based household food strategy. The 'macro'-based household food strategy focuses on the overall food security while the 'micro'-based household food strategy focuses on food sufficiency in specific areas such as urban centers.

Currently, the Namibian food procurement system is vulnerable to externalities such as climate change and variability, global economic crises, global food shortage and epidemic diseases. COVID-19 was a good example from which Namibia should learnt that food sufficiency and security should be a critical component in a development agenda of any country.

Aquaponics and solar technologies are some of the recognized CRTs through which urban farmers and residents could supplement their food supply by engaging in horticultural, finfish, shellfish and crayfish farming activities as well as small livestock production. More importantly, the agriculture and renewable energy sectors are one of the few sectors in Namibia which are sustainable and resilient to climate change and weather variability.

Despite the significance of CRTs and their potential to boost local food production, Regional Councils and Local municipalities or town councils have not yet benefited from the CRTs. This is because the concept of Urban Farming is rarely applied in urban centers in Namibia. The concentration of the enabling youthful population in urban areas could mean that urban farming has the potential in Namibia.

2. APPROACH AND METHODOLOGY

2.1. Desk studies and literature review

Desk research and literature reviews were conducted in order to compile information about the location, the people who live there, and the present and historical land usage. The Namibian population census report, the population census report for the //Kharas region, the Namibian biological biodiversity brochure, and other important documents were evaluated. In addition, the Namibian Constitution, the Nature Conservation Amendment Act No. 6 of 1996, Namibia's Environmental Assessment Policy for

Sustainable Development, the Pollution Control and Waste Management Bill, the Water Act and Water Resources and Management Act, the Communal Land Reform Act, the Public Health Act, and customary law (Bill of Rights 1990, Principles of State Policy 1990, MET 1995, MET 2013) were among the legal documents reviewed.

2.2. Public consultation process

I & APs play a crucial part in the public consultation procedure. The public consultation procedure is explicitly governed under section 21 of the NEMA regulations (regulations of 2012). Notices were given in accordance with section 21(2) in the manner described below.

2.2.1. Public notices at public places

Public notices were placed at various retail shops, Home Affairs office, Ministry of Agriculture and at the Ministry of Environment, Forestry and Tourism as well as at the Municipality and Urban Constituency office.

2.2.2. Request for concern letters

Concern letters were requested from the Ministry of Agriculture and the Municipality of Keetmanshoop as well as the Office of the Governor in //Kharas region.

2.2.3. Advert in newspapers

Notices were placed in 2 (two) local newspapers, namely Confident and The Villager newspapers once a week for 2 consecutive weeks on 27 January and 3 February 2023.

2.2.4. Public meeting

The public meeting was held in Keetmanshoop Multi-purpose Youth Resource Centre Hall on 18 March 2023.

2.3. Release of draft EIA/Scoping report

This was crucial in terms of informing IAPs of the project's advancement since the last public meeting. The draft EIA/scoping report was distributed to all registered IAPs by email in May 2023. In addition, the hard copies were availed for public access at Multi-purpose Youth Resource Centre Hall. The time to view the report was from 8:30-13:00 and 14:00 and 14:00-17:00 from Monday (19 May 2023) to Friday (23 May 2023). Since no comments were received by the due date, the period to review the report was extended to 31 May 2023.

2.4. Environmental impact assessment method

2.4.1. Leopold matrix method

The Leopold matrix assessment was used in the evaluation of impacts. This is a qualitative environmental impact assessment method, and it involved a series of stages including impacts prediction, description, and assessment as described below.

2.4.2. Valued ecosystem components

Project activities to be undertaken will have impacts on the essential biological, physical and human components of the environment. These environmental components are also well known as VECs (valued ecosystem components). The first requirement in the Leopold matrix was the identification of VECs as illustrated in the table below.

Impacts were evaluated using the Leopodt Matrix by looking at environmental resource sensitivity and the scope and coverage of impact as well as their magnitude, probability and significance.

2.4.2. Sensitivity of environmental resources

SENSITVITY RATING		**CRITERIA**
1	Negligible	The environmental resource is resistant to impacts or has less environmental value.
2	Low	The environmental resource could either absorb impacts or is able to rebound its original state after the impacts, or is of low environmental or social value or is of local importance.
3	Medium	The environmental resource is either unable to absorb impacts or after impacts is unable to rebound to original state, or is of high environmental or social value, or is of national importance.
4	High	The environmental resource has moderate capacity to absorb impacts, has some environmental or social value, or is of regional importance.
5	**Very high**	The environmental resource has little or no capacity to absorb change without fundamentally altering its present character, is of very high environmental or social value, or is of international importance.

2.4.3. Magnitude of impacts

0	No observable impact
1	Low impact
2	Tolerable impact
3	Medium high impact

4	High impact
5	Very high impact

2.4.4. Duration of impacts

T	Temporary
P	Permanent

2.4.5. Geographic coverage

L	Localized impacts or limited to location
O	Impact of importance to municipality
R	Regional impacts
N	National impact
I	International

2.4.6. Probability

LP	**Low** probability (possibility of impact occurring is low, below 25%).
P	**Probable** (there is a distinct possibility that it will occur, approximately 50%).
HP	**Highly probable** (the impact is most likely to occur, 75%).
D	**Definite** (the impact will occur, 100%).

2.4.7. Significance

	ENVIRONMENTAL RESOURCE CHARACTERISTICS				
IMPACT SEVERITY [Magnitude, duration, extent, probability]	**Very high 5**	**High 4**	**Medium 3**	**Low 2**	**Negligible**
Very high 5	**Major [5/5]**	**Major [4/5]**	Moderate [3/5]	Moderate [2/5]	Minor [1/5]
High 4	**Major [4/5]**	**Major [4/4]**	Moderate [3/4]	Moderate [2/4]	Minor [1/4]

Medium 3	**Major [3/5]**	Moderate [3/4]	Moderate [3/3]	Minor [2/5]	None [1/3]
Low 2	Moderate [2/5]	Moderate [2/4]	Minor [2/5]	None [322]	None [1/2]
Negligible 1	Minor [2/5]	Minor [2/5]	None [3/1]	None [2/1]	None [1/1]

2.4.8. Mapping of significant impacts

The last stage was to provide a detailed evaluation of impacts as well as their summary evaluation, combining magnitude and importance. This summary evaluation highlighted significant impacts that should receive a higher priority during impacts mitigation and was the basis for developing a sound EMP.

This was a critical stage during which EAPs were to probe issues in detail, for example by asking the following questions:

- Which impact is most significant?
- Which impact should be prioritized during mitigation?
- Which impacts should be monitored?
- Which activity is critical during which phase?
- Which receiving environment is vulnerable during which phase?
- What is the long-term impacts worth monitoring during the operation phase?
-

2.5. Environmental Management Plan

The above questions are very important in the designing an effective EMP and implementation of the environmental monitoring & evaluation plan. As often argued in literature EIA as a tool for sustainable development is not sufficient in evaluating development projects because it has its weaknesses. These weaknesses include the fact that its scope is limited when measured on a temporary scale. It merely provides a snapshot overview of baseline conditions of a development project and fail to consider indirect environmental impacts or cumulative impacts that may result as result of a development.

Therefore, to make up for this the EMA (no. 7 of 2007) and its regulations (of 2012) sometimes require preparations of the EMP and environmental monitoring & evaluation plan.

3. RELEVANT LEGISLATIONS

Table 1: Relevant administrative, legal and policy requirements.

LEGISLATION	DESCRIPTION
The Namibian Constitution	*Article 95 of Namibia's constitution provides that:* *"The State shall actively promote and maintain the welfare of the people by adopting, inter alia, policies aimed at the following:* *(l) management of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future; in particular the Government shall provide* *measures against the dumping or recycling of foreign nuclear and toxic waste on Namibian territory."* This article recommends that a relatively high level of environmental protection is called for in respect of pollution control and waste management.
Environmental Management Act no 7 of Namibia (2007)	*The Act provides a broad definition to the term "environment" - land, water and air; all organic and inorganic matter and living organisms as well as biological diversity; the interacting natural systems that include components referred to in sub-paragraphs, the human environment insofar as it represents archaeological, aesthetic, cultural, historic, economic, palaentological or social values*
Environmental Assessment Policy of Namibia	*The Environmental Assessment Policy of Namibia requires that all projects, policies, programmes, and plans that have detrimental effect on the environment must be accompanied by an EIA. It further provides a guideline list of all activities requiring an impact assessment. The proposed development is listed as a project requiring an impact assessment. The policy provides a definition to the term "environment" - broadly interpreted to include biophysical, social, economic, cultural, historical and*

	political components and provides reference to the inclusion of alternatives in all projects, policies, programmes and plans. Cumulative impacts associated with proposed developments must be included as well as public consultation. The policy further requires all major industries and mines to prepare waste management plans and present these to the local authorities for approval. ***Sustainability Principles:*** ***Cradle to Grave Responsibility*** *This principle provides that those who manufacture potentially harmful products should be liable for their safe production, use and disposal and that those who initiate potentially polluting activities should be liable for their commissioning, operation and decommissioning.* ***Precautionary Principle*** *There are numerous versions of the precautionary principle. At its simplest it provides that if there is any doubt about the effects of a potentially polluting activity, a cautious approach should be adopted.* ***The Polluter Pays Principle*** *A person who generates waste or causes pollution should, in theory, pay the full costs of its treatment or of the harm, which it causes to the environment*
EMA regulations (of 2012)	*This legal document guides on how the EMA (no. 7 of 2007) should be implemented. In summary it:* • *Lists and describes all activities that require EIAs;* • *Explains in details duties of proponents and general requirement of EAPs (Environmental Assessment Practitioners);* • *Clarifies the public consultation process in details, which specifically requires:*

	○ *Placements of public notices at public places,* ○ *Written notices to owners of land, local authority, regional councils or organs of state, and* ○ *Adverts in 2 local newspapers once a week for 2 consecutive weeks.* • *Provides format of the EIA/scoping report which follows after the public consultation process, and* • *Guides the application process to obtain the ECC.*
Pollution Control and Waste Management Bill *(guideline only)*	*Of particular reference to the above, the stated project, Parts 2, 7 and 8 apply.* *Part 2 provides that no person shall discharge or cause to be discharged any pollutant to the air from a process except under and in accordance with the provisions of an air pollution licence issued under section 23.* *Part 2 also further provides for procedures to be followed in licence application, fees to be paid and required terms of conditions for air pollution licences.* *Part 7 states that any person who sells, stores, transports or uses any hazardous substances* *or products containing hazardous substances shall notify the competent authority, in accordance with sub-section (2), of the presence and quantity of those substances.* *The competent authority for the purposes of section 74 shall maintain a register of substances notified in accordance with that section and the register shall be maintained in accordance with the provisions.* *Part 8 provides for emergency preparedness by the person handling hazardous substances, through emergency response plans.*

Atmospheric Pollution Prevention Ordinance of Namibia (No. 11 of 1976)	*Part 2 of the Ordinance governs the control of noxious or offensive gases. The Ordinance prohibits anyone from carrying on a scheduled process without a registration certificate in a controlled area. The registration certificate must be issued if it can be demonstrated that the best practical means are being adopted for preventing or reducing the escape into the atmosphere of noxious or offensive gases produced by the scheduled process.*
Hazardous Substances Ordinance (No. 14 of 1974)	*The Ordinance applies to the manufacture, sale, use, disposal and dumping of hazardous substances, as well as their import and export and is administered by the Minister of Health and Social Welfare. Its primary purpose is to prevent hazardous substances from causing injury, ill-health or the death of human beings.*
Water Resources Management Act, 2004	*This is the principal law dealing with water pollution in Namibia. A key objective of the Act is to provide for the management, development, protection, conservation, and use of water resources. Part I of the Act deals with Preliminary Provisions and under section 3 addresses fundamental principles. Relevant principles include; - harmonisation of human needs with environmental ecosystems and the species that depend upon them, while recognising that those ecosystems must be protected to the maximum extent; management of water resources so as to promote sustainable development; prevention of water pollution, and the polluter's duty of care and liability to make good; and meeting Namibia's international obligations (e.g. Ramsar and CBD) and promoting respect for Namibia's rights with regard to internationally shared water resources and, in particular, to the abstraction of water for beneficial use and the discharge of polluting effluents.*

The Labour Act, 2007, Act no. 11 of 2007.	*The Labour Act gives effect to the constitutional commitment of Article 95 (11), to promote and maintain the welfare of the people. This Act is aimed at establishing a comprehensive labour law for all employees; to entrench fundamental labour rights and protections; to regulate basic terms and conditions of employment; to ensure the health, safety and welfare of employees under which provisions are made in chapter 4. Chapter 5 of the act improvises on the protection of employees from unfair labour practices.*
Aquaculture Act No. 18 of 2002	*The Aquaculture Act regulates and controls aquaculture activities in Namibia to promote the sustainable development of aquaculture resources. Under the Aquaculture Act, the following apply to the proposed development:* • *Part III Aquaculture Licenses; Sections 11 to 24.* • *Part IV Management and Control measures; Sections 25 to 30.* • *Part VI Aquaculture Development Zones; Sections 25 to 30.*
Aquaculture (Licensing) Regulations of 2003	*The Aquaculture (Licensing) regulations came into force on 3 December 2003. This regulation is associated with the Aquaculture Act 18 of 2002. The following stipulated in the Regulations apply to the proposed Aquaculture Project:* *"Part IV of the regulations concerning aquatic organism's health management in aquaculture facilities. This regulation states that all aquatic health management should conform with international standards and consistent with Namibia's human rights. Part V of the Regulation covers the control of disease outbreaks in Namibian waters, specifically disease zoning, emergency disease situations and intra-national movements of live aquatic organisms. Part VI deals with the protection of the aquatic*

	environment and covers the release and escape of aquaculture products, the discharge of wastes from aquaculture facilities and the introduction and transfer of aquatic organisms".

Table 1: Summary of other laws, strategies, bills and policies relevant to this project.

Acts, Policies, or Regulations	**Relevance**
Water Act, 1956 (No. 54 of 1956), as amended	Abstraction from and discharge into the sea
Public Health Act 36 of 1919 (as amended)	Export fish products and import
Namibian Ports Authority Act (No. 2 of 1994) and Port Regulations	Harbour facilities to be used
Nature Conservation Amendment Act No.5 of 1996	Impact on biodiversity and protected areas
National Solid Waste Management Strategy	Solid waste management

4. TECHNICAL DETAILS

4.1. Designed and Operation

4.1.1. Description of Proposed Activity

The proposed Urban Farm will be located in Keetmanshop (Erf. 2290) and will be the first multi-trophic Urban Farm in the //Karas Region. The farming system where several species are farmed is known as multi-trophic farming as it produces multiple produces and products. The farm's target market is Keetmanshoop, Lüderitz and Windhoek mainly targeting low to middle income households in these urban areas which are also termed as 'Food Deserts'. This population segment is at the risk of increasing costs of living in urban areas as seen from increasing food prices, housing prices, rentals and municipal bills.

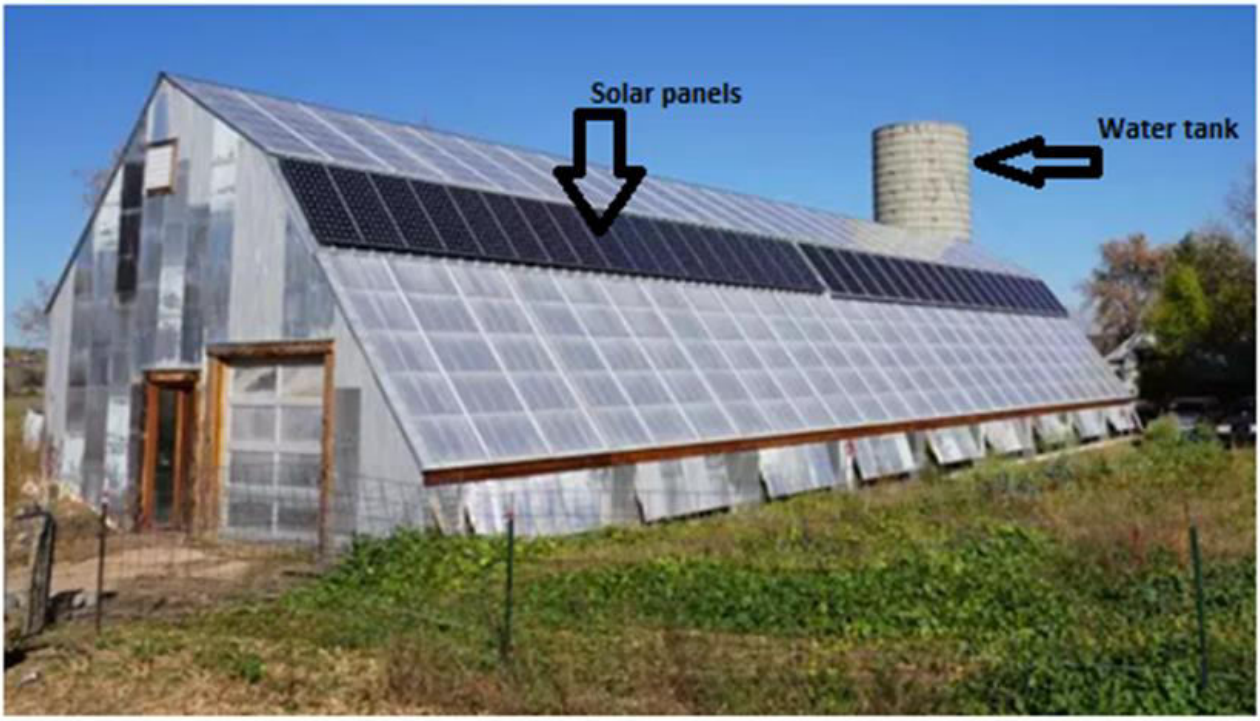

Figure 1: Typical greenhouse for Aquaponic farming.

4.1.2. Design and Operation

The design and operation of the proposed Brukkaros Aquaponic farm will follow all the relevant Guidelines, which require compliance with local legislations, National Standards and Regulations. These standards ensure that environmental compliance is implemented, maintained, monitored and that the potential impacts to the biophysical environment are greatly reduced and minimized.

4.1.3. Layout plan

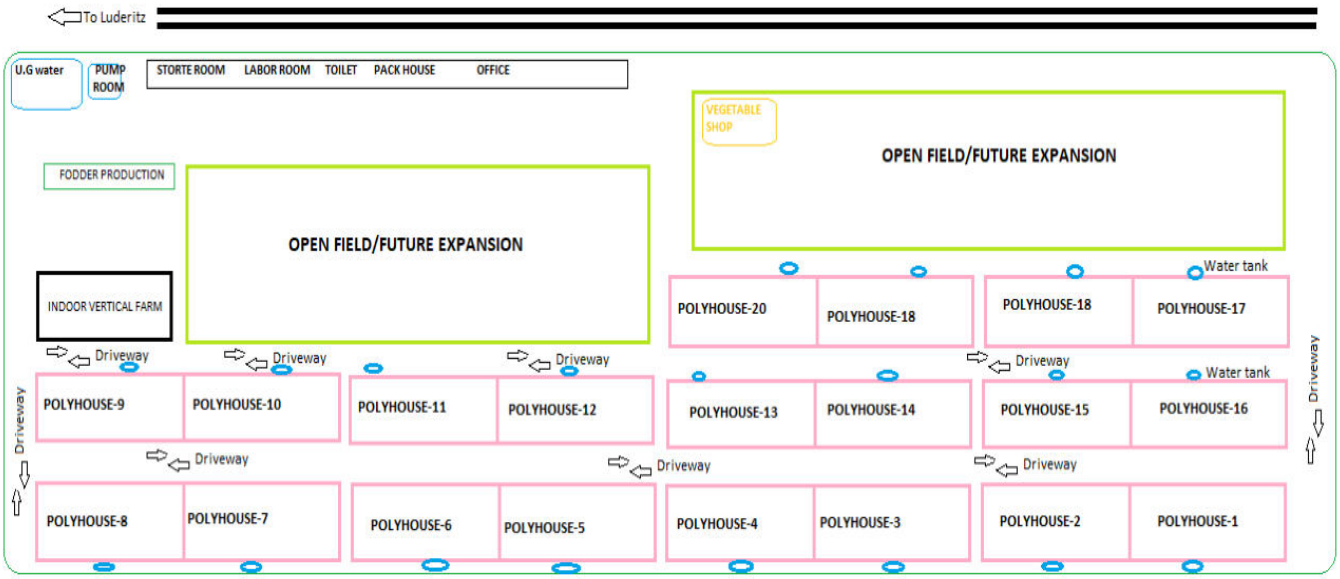

Figure 2: Proposed layout plan (a detailed layout plan is available but will only be provided in the EIA/Scoping Report).

4.1.4. Site Access

Access to the site will be via the B1 road which just passes by the proposed farm site. The site layout makes provision for the adequate movement of vehicles so that no untoward/reversing manoeuvres would be required when entering and exiting the site. Access to the site has been designed to conform to the Keetmanshoop Town Council Transport Standards and the Roads Authority requirements.

4.1.5. Sanitation

Two alternative methods of sewage disposal to serve the staff and customer ablutions have been assessed by ECUTS during this impact assessment phase of the proposed development (Table 1.1). The first was a small waste water treatment plant and the second, a conservancy tank. The use of septic tanks and soak ways are not feasible for the proposed site due to the geohydrological conditions. The sewage being treated would be that of human origin and would not include commercial or trade effluents.

5. THE RECEIVING ENVIRONMENT

5.1.1. Baseline physical environment

5.1.1. Topography

The surrounding landscape of the proposed site is reasonably high and mountainous, consisting of thorn woodlands, shrubs open grasslands and rocks. The general topography of Keetmanshoop is that it is located at an Elevation of 1019 m above the sea level with Barometric Pressure of up to 90 KPa. The nearest water features to Keetmanshoop is the Naute Dam. It was built in 1970 and was officially commissioned in September 1972. It is the third largest dam in Namibia after Hardap Dam and holds up to 69 million cubic metres of water. The dam's source is the Löwen River, a tributary of the Fish River. Also close to Keetmanshoop is the newly inaugurated Neckartal Dam.

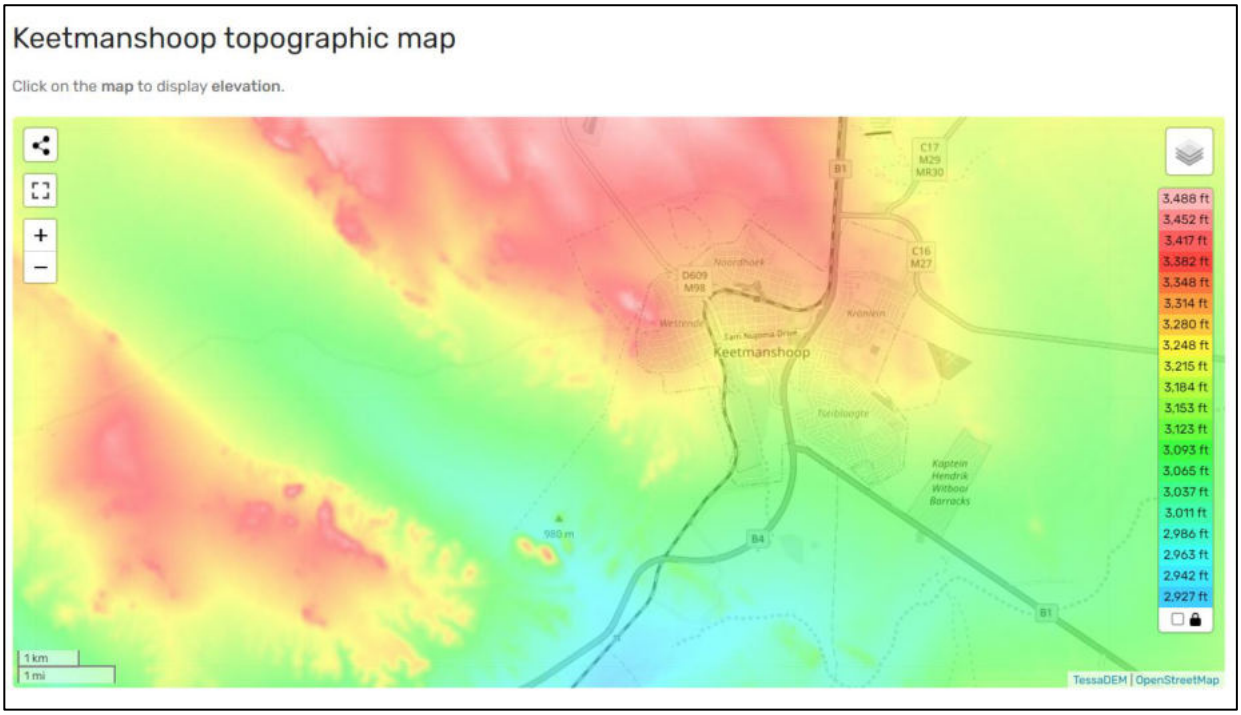

Figure 3: Topographical map of Keetmanshoop (topographic-map.com)

5.1.2. Climate and weather

Keetmanshoop has a hot desert climate (Köppen climate classification *BWh*), with long, very hot summers and cold winters. The annual average rainfall is 150 mm. The climate is characterized by sunshine and dryness as well as moderate heat (Rudloff 1988).

Table 2: Annual climate data for Keetmanshoop (Source: Tabulation of climate statistics for selected stations in Namibia).

Climate data for Keetmanshoop [hide]													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C (°F)	34.8 (94.6)	34.0 (93.2)	32.2 (90.0)	28.8 (83.8)	25.0 (77.0)	21.7 (71.1)	21.3 (70.3)	23.5 (74.3)	27.2 (81.0)	30.1 (86.2)	32.4 (90.3)	34.5 (94.1)	28.8 (83.8)
Average low °C (°F)	19.0 (66.2)	19.3 (66.7)	17.8 (64.0)	14.4 (57.9)	10.4 (50.7)	7.0 (44.6)	6.4 (43.5)	7.5 (45.5)	10.7 (51.3)	13.7 (56.7)	15.7 (60.3)	17.6 (63.7)	13.3 (55.9)
Average precipitation mm (inches)	24 (0.9)	42 (1.7)	36 (1.4)	15 (0.6)	5 (0.2)	2 (0.1)	1 (0.0)	1 (0.0)	3 (0.1)	6 (0.2)	11 (0.4)	13 (0.5)	159 (6.1)
Average relative humidity (%)	28	36	40	40	38	39	36	31	27	24	24	25	32
Mean monthly sunshine hours	353	300	312	306	304	287	305	323	319	343	348	370	3,870
Percent possible sunshine	84	82	82	89	91	91	93	93	89	87	86	86	88

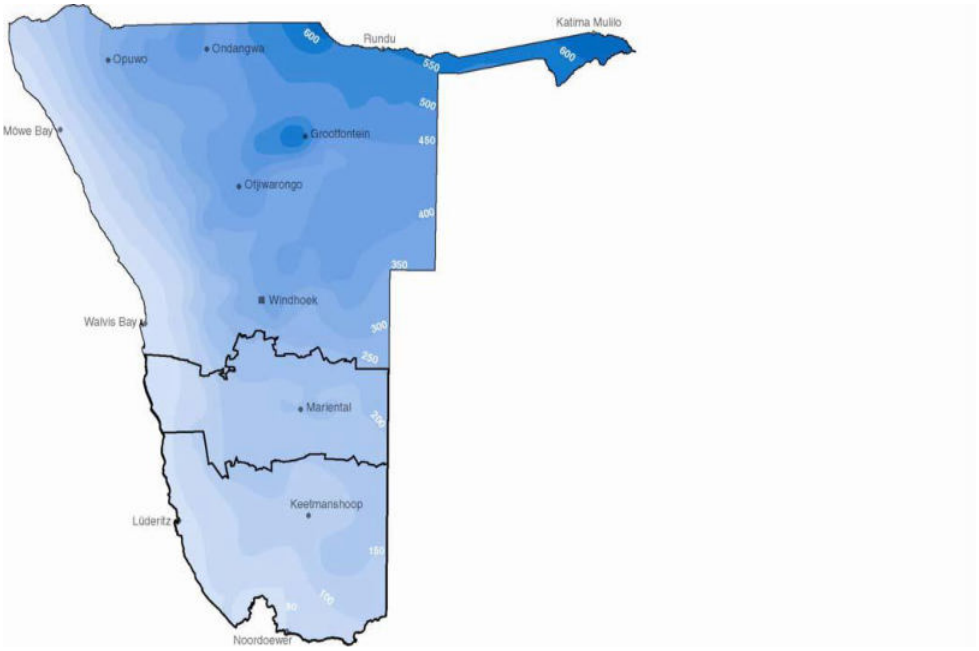

Figure 6: Namibia rainfall map (Source: Ministry of Agriculture Water and Forestry, 2009)

5.1.3. Hydrogeology

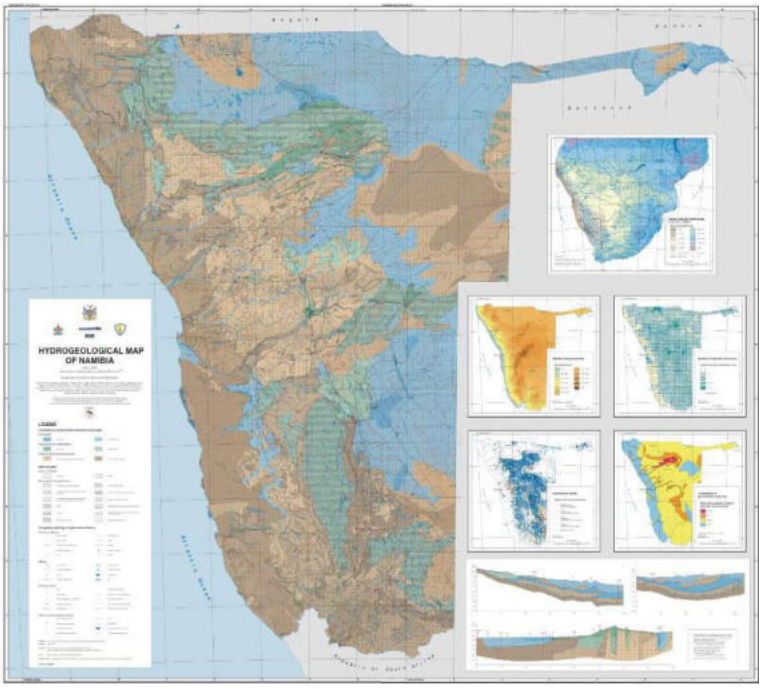

Figure 6: Hydrogeological map of Namibia (Source: Ministry of Agriculture Water and Forestry, 2009)

5.1.4. Stormwater & Surface Runoff

The proposed area for the Brukaros Aquaponic Farm is currently vegetated but undeveloped with shrubs and grasses. The vegetation is inferred to have led to a high infiltration of surface water and therefore very little evidence of erosion was noted during site visits by ECUTS. As the site is currently undeveloped, there is currently no formal stormwater management system evident. The introduction of formal drainage system on the site will likely divert the surface water to drain into the formal drainage system during storm events.

5.2. Ecosystem diversity

Namibia's biomes can be loosely divided into five categories comprised of: coastal/marine, desert, Karoo, Broad-leafed and shrub savannah Acacia savannah, and wetlands savanna (MET, 2010). Keetmanshoop is a small town in the south of Namibia. It is situated in the //Karas region which is characterized by low rainfall, high evaporation rates and short sparse vegetation (//Karas regional poverty profile 2005-2006). The town

is situated near two quiver tree forests, one of them being a national monument and a major tourist attraction of Namibia. Also close to Keetmanshoop is the Naute Dam and newly inaugurated Neckartal Dam.

5.3 Flora diversity

There are many plant species in //Karas region that are unusual, rare or endangered such as the Quiver Tree *(Aloidendron dichotomum)*. A large number of species are also endemic to the area. As a transitional zone between winter and summer rainfall, the areas have several plant species compared to similar regions. Evidently, 1,050 species of flowering plants and ferns have been recorded south of the //Karas Region, primarily in the in the Sperrgebiet. This is nearly a quarter of Namibia's entire plant diversity, although the Sperrgebiet covers just 3% of the land area. A high proportion of these plants are succulents. As a consequence of this diversity and the concentration of species having restricted ranges, the Sperrgebiet has been identified as a "hotspot" flora area with vegetation of high botanical value. The Sperrgebiet has 180 plant species that are fully endemic to Namibia, while nearly 200 species are near-endemics because their distribution extends south into South Africa. Red Data species in the Sperrgebiet include perennial shrubs such as *Marlothiella gummifera*, a Namibian endemic known from only a handful of locations, spiny succulents such as *Hoodia alstonii* and *Hoodia officinalis*, clump-forming succulents such as *Tridentea pachyrrhiza*.

5.4 Fauna diversity

//Karas region has many species of animals found close to Keetmanshoop such as the Arachnids (spiders and scorpions) 18 species endemic to Namibia, Insects (156 species) endemic to Namibia, Fish (1 specie) endemic to the lower Orange and classified as vulnerable, Amphibians such as coastal hummocks (1 specie), desert rain frog - confined to Northen Cape and Sperrgebiet coastline.

Tortoises and terrapins such as the (*Nama padloper)* are endemic to southern Namibia and are endangered. Lizards (19 species) endemic to Namibia, including the dwarf chameleon and two kinds of girdled lizards restricted to //Karas Region. There are also 5

species of snakes that are endemic to Namibia, including the dwarf adder, desert mountain adder restricted to //Karas Region, and the southern African python which is vulnerable.

Mammal species occur on farmlands and protected areas. There are 10 species (mostly rodents and bats) endemic to Namibia, 3 of them to southern Namibia. Vulnerable species are: cheetahs, small-spotted cats and pangolins. Brown hyaenas living on the Namibian coast forage amongst seal colonies, scavenging and killing seal pups, but they also eat other mammals, birds, reptiles and fish.

5.5 Quiver (Kokerboom) Tree Forest as a National Monument

Because these wonky plants prefer to grow almost exclusively atop medium-to-large dolerite rock formations, they normally grow great distances from each other. But in a small rocky pocket outside of Keetmanshoop, a large number of them grow in uncharacteristically close proximity, creating a forest-like landscape. It's one of the only known naturally occurring such sites in the world.

Despite its name, the Quiver Tree *(Aloidendron dichotomum)* is not a true tree, but rather a species of Aloe capable of growing over 9 metres tall. The Quiver Tree Forest was declared a National Monument of Namibia on 1 June 1995. The monument is operated as a working farm and guesthouse adjacent to the forest and permit travelers to hike around the property, even offering occasional night tours.

Figure 5: Quiver tree forest (Source: Google photos).

5.6 Human environment

5.6.1. Climate and weather

The Benguela upwelling current system largely influence local climate and weather along the western parts of all 4 Namibia's coastal regions including //Karas region. Subsequently, this climatic force had led to formation of the Namib Desert. Precipitation in the region is low and occur mainly in the form of fog. The fog supports less vegetation and only small-livestock farming is commonly practiced in //Karas region. The region mainly depends on exploitation of mineral and capture fisheries resources. The trend observed globally related to declining capture fisheries will soon affect the town of Lüderitz, which mainly depend on capture fisheries. The town is more vulnerable compared to Walvis Bay town, given the limited port facilities and fish processing factories.

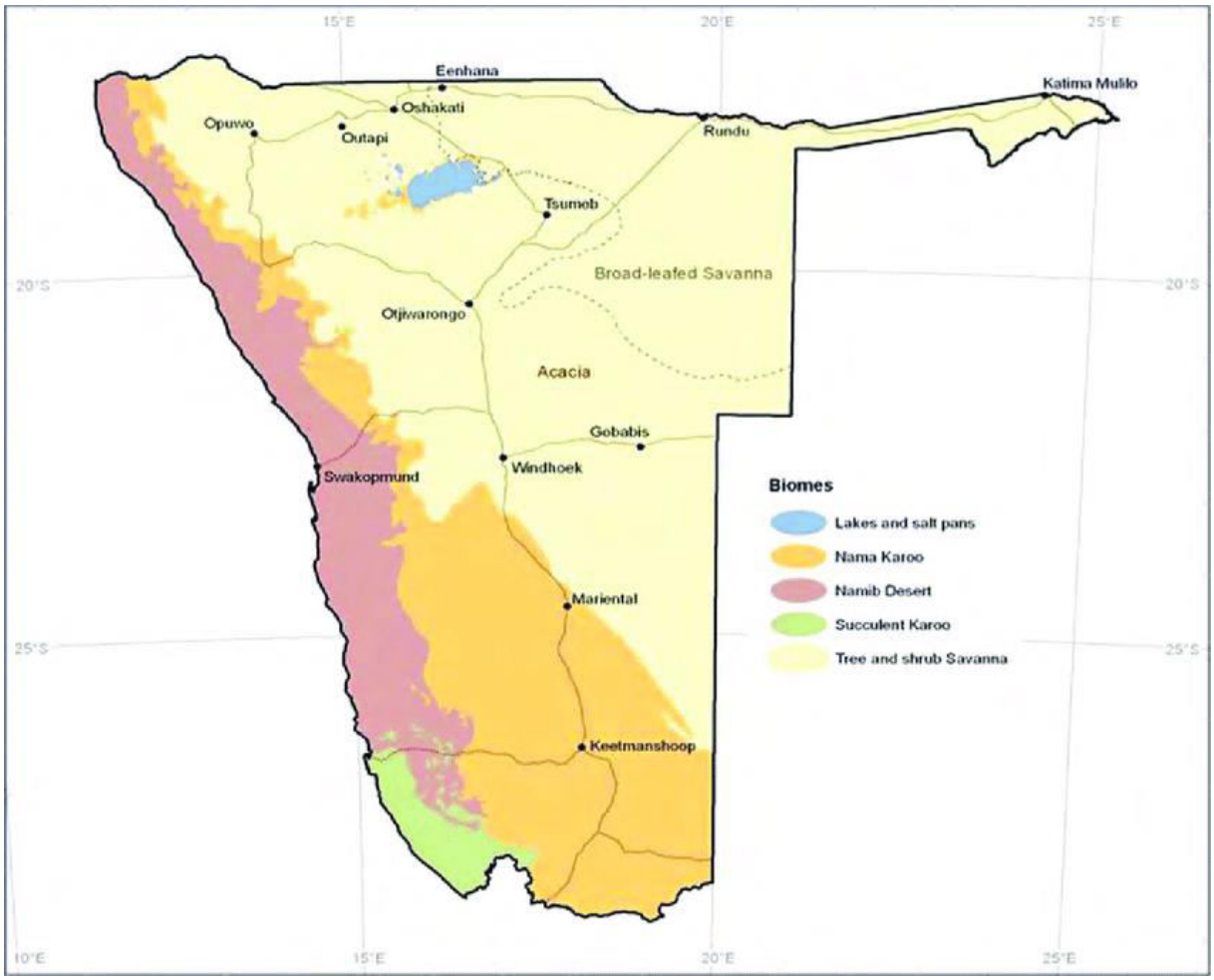

Figure 21: Namibia's biomes (source: Dieckmann et. Al. 2013).

5.6.2. Demography

There are 4 regions along the Namibian coast, namely //Karas, Hardap, Erongo and Kunene. //Karas region is the largest but yet the least densely populated compared to other regions. This is mainly due vast land which is inhabitable and also partly due to lower population growth rate of only 1.1%. There are 77,421 people in //Karas region based on the 2011 population census (NSA, 2011). The most commonly spoken languages are Afrikaans (36%), Oshiwambo (27%) and Damara/Nama (23%). Age composition is similar to other regions; being dominated by persons between 15 and 59 years of age.

Table 4: **selected demographics in Namibia's 4 coastal regions (NSA, 2011).**

Demography	**//Karas**	**Hardap**	**Erongo**	**Kunene**
Population size	77,421	79,507	150,809	86,856
Annual growth rate %	1.1	1.5	3.4	2.3
% living in Urban	54	60	87	26
% living in rural	46	40	13	74
Population density	0.5	0.7	2.4	0.8
Age composition				
<5 years	11	11	11	17
5-14 years	19	21	17	25
15-59 years	63	59	67	51
60+ years	6	7	6	7
Citizenship				
Namibian	97	98	96	97
Non-Namibian	1	2	4	3
Literacy rate	97	91	97	65
% of people employed	68	65	70	64
Main source of income in %				
Farming	5	7	3	32
Wages & Salaries	72	64	73	41
Cash remittance	5	7	5	5
Business (non-farming)	5	4	9	8
Pension	11	15	8	12

Figure 22: Namibia map and regional boundaries (Source: Namibia Maps & Facts - World Atlas).

5.6.3. Economy

Due to aridity, farming is predominantly small-livestock; being comprised of sheep and goats. The main source of income is wages and salaries (72%), followed by pension (11%), farming (5%) and other sources. There are several minerals exploited in //Karas region; namely diamond, lead, zinc, precious and semi-precious metals as well as Kudu gas offshore. Diamond mining is the main economic activity, followed by fishing.

Contribution by lead and zinc mining is insignificant due to reduction in operations at one of the mines in 2020.

5.6.4. Keetmanshop

Keetmanshoop is the largest urban center in the //Karas region (the furthest southern part of Namibia). The town is home to about 30,000 residents which is a significant increase from the 18,000 residents recorded during the 2011 National Census. There are approximately 6,000 households of which 62% is of productive age, and around 27% of these residents are unemployed. The growth in population can be attributed to natural internal population growth as well as urbanization from nearby rural communities and job seekers from other parts of the country.

The pull factors to Keetmanshoop includes real and perceived job and business opportunities linked to several public works projects such as the Neckertal Dam, University of Namibia Southern Campus and Mass Housing Development Project.

Historically, southern Namibia is renowned for livestock farming; goats, sheep and to a lesser extent cattle. On average about 2,000 units of goats and sheep are sold monthly in Keetmanshoop. This represents a turnover of around N$24 million annually at a primary level (Keetmanshoop Municipality, 2023).

Keetmanshoop attracts significant interest from the private and public investors. Investment opportunities range from real estate, retail, solar energy, logistics and hospitality. The town boasts virgin town land totaling about 40,000 hectares which is characterized by hospitable terrain for most land use nodes (Keetmanshoop Municipality, 2023).

5.7. History and cultural diversity

Keetmanshoop, town is situated in the southeastern part of Namibia. The town lies about 460 km south of Namibia's Capital City of Windhoek. Keetmanshoop was established in 1866 as a Rhenish (German Lutheran) mission station for the local Nama group of Khoekhoe people, and it was named after Johann Keetman. It became a town after establishment of a German garrison in 1894. The town is considered a capital of south

Namibia and it is an important epi-economic center. The principal industries are Karakul production, processed foods and leather goods. The Naute Dam which is located along the Löwen River is expected to boost local agricultural production in the near future. Major spoken languages are Afrikaans (40%); Nama/Damara (26%) and Oshiwambo (23%).

6. PUBLIC PARTICIPATION PROCESS

A public participation process (PPP) which comprises of Interested and Affected Parties (I&APs) and key stakeholders were followed in accordance with the Environmental Management Act no 7 of 2007 and the Environmental Assessment Policy. The Public Participation Process (PPP) forms a key component of the EIA process and the public participation undertaken resulted in the identification of a number of issues. This section provides an overview of the PPP undertaken as part of the EIA process for the proposed development.

The aims and objectives of the PPP process were to:

- Identify and notify Interested and Affected Parties (IAPs) of the proposed development;
- Provide IAPs the opportunity to comment on the proposed activity and raise issues and concerns, and
- Document IAP issues and provide feedback.

To achieve the PPP's aims and objectives Consultants undertook various public consultation activities.

In summary, the PPP process comprised of the following activities:

- Identification of interested and affected parties;
- Placement of advertisements in the local print media (**Appendix 1**);
- Compilation and distribution of a background information document (BID) with registration form attached **(SCHEDULE I**);
- Invitation letters to key stakeholders. These letters were hand delivered and each stakeholder was requested to sign a copy as proof the invitation letter is received (**Appendix 2**);
- Placement of on-site notice and public outlets notice boards. Photos of notices were taken and are provided in this report (see **Appendix 3**);

- Public meeting on 18 March 2023 in Keetmanshoop. The attendance register (***table 6***) and IRR (issues and response report) (***table 7***) are provided, and
- Availability of Reports for public inputs.

6.1. Identification of Interested and Affecting Parties

Consultants developed an initial database consisting of key IAPs and stakeholders. This database was maintained throughout the duration of the PPP process; IAPs and stakeholders were kept in loop with regard to project activities including public adverts and dates of the public meetings.

6.2. Availability of Background Information Document (BID)

A Background Information Document (BID) was compiled and uploaded on the GRN's portal for EIAs on 22 February 2023 at http://eia.met.gov.na/portal/view/1028 for public to access. The BID was also distributed before the public meeting on the 18th March 2023 to registered IAPs and key stakeholders.

6.3. Public adverts

Public adverts were placed in 2 local newspapers for 14 consecutive days in accordance with the Environmental Management Act (No. 7 of 2007) and the Environmental Assessment Policy. The advertisements served to inform IAPs and stakeholders of the proposed development, invited individuals to register as IAPs, and requested that comments or concerns regarding the proposed development be forwarded to Consultants.

6.4 Public Meeting

A public meeting was held on 18 March 2023 at 09:00 at the Keetmanshoop Multipurpose and Youth Center hall. The Consultants introduced the project to those in attendance, and this enabled key stakeholders and IAPs the opportunity to discuss the proposed Aquaponic farm development in Keetmanshoop, as well as give them the opportunity to discuss/highlight/raise any concerns or issues that they have with regards to the project.

Table 6: List of Interested and Affected Parties.

No	Name	Contact	Organization
1.	Nelimona Iipinge	ndelimonachox@gmail.com	Namibian Environment and Wildlife Society
2.	Ester Alfeus	esterndap@gmail.com	Community member
3.	Henly Gases	henlygases@gmail.com	Community member
4.	Cyril Pieters	pieters@iway.na	Community member
5.	Shekupe Ndinelago Mbualala	mshekupe@gmail.com	Community member
6.	Alex Lambert	Alexdonald.lambert@yahoo.com	Community member
7.	Floritha Nel	floriethanel@gmail.com	Community member
8.	Ivan Mueze	Muezeivan@gmail.com	Community member
9.	Changley Kooper	Changley.b@gmail.com	Community member
10.	Joseph Tjikemba	Josephjoetjikemba@gmail.com	Community member
11.	P Witbooi	0813576037	Community member
12.	Paulus Kauluma	0818089218	Community member
13.	Anzo Both	Anzoboth9@gmail.com	Brukkarros
14.	Zadok Shipindo	zadokshipindo@gmail.com	Community member

Table 7: Issues and responses report (IRR).

Issue	Response
The area indicated in the BID map also belongs to Brukkaros but the community was being curious on how the farm with 20 green houses will fit since it is very small.	The area is on the opposite side of the road and this was only communicated by the Proponent after the BID is released and had since then rectified.
Is there a possibility to offer training on aquaponics and horticulture management?	This is noted and will be communicated to the Proponent. The Proponent replied that should there be such an opportunity, this information will be availed through the Keetmanshoop Municipality which will communicate to the community.
How will the Proponent involve members of the community who are willing to invest in the project?	This is noted and will be communicated to the Proponent. If such a need arise, members of the community will get the priority to invest first before other investor; however, this opportunity is currently non-existent.
Pegging marking where the project will be constructed is not done yet. This will help members of the public to know how they will be affected by the proposed development.	This will be communicated to contractor. The Proponent has not yet appointed the contractor because the project has not yet been approved by the relevant authorities including the MEFT.

6.5. Availability of the Reports for public inputs

The Draft Scoping Report copies were distributed to the relevant authorities and key IAPs registered between 28 April and 19 May 2023. Telephonic and email communications were made with each of the IAPs listed in the IAP database to inform them of the availability of the Draft Reports. Digital copies of the Report were also shared by email. The last date for comments was 23 May 2023.

All comments received by IAPs were incorporated into the final Reports, which essentially documents any amendments made to the Draft Reports and includes correspondence in terms of comments received on the Draft Reports and responses to IAPs. The final reports were submitted to the Environmental Commissioner for Record Decision on 30 May 2023.

7. ENVIRONMENTAL IMPACTS ANALYSIS

Project activities during each phase were predetermined and described in the table below. Each project activity has impacts on the VECs (valued ecosystem components) as explained in the ***table 7.***

7.1. Impacts prediction

Impacts were listed in ***table 8*** and according to them each activity will have impacts on the receiving environment. The increased level of noise as well as dust and gaseous emissions were common because each construction activities is expected to generate noise and dust. Additionally, the machineries and construction vehicles used will emit gases resulting from fuel combustion. Although these impacts are not significant as they are temporary and localized, they will still need to be mitigated and monitored throughout this project cycle.

7.2. Mapping of impacts

During impact assessment (***table 9***) the 16 impacts were identified, of the which the following came out quite strongly:

- **Water consumption and use.** This is likely to increase and the Proponent needs a consent from Keetmanshoop to ascertain project water requirements.
- **Employment among locals.** As the project construction and operation phase progress from one phase to another, the contractors will change employees.

Individuals who lose jobs may experience increased psychological stress associated with the uncertainty of securing future household income, a reduction in general well-being and quality of life. Changes in the employment status of heads of households may also disrupt family life, relationships and could potentially affect the welfare of children.

- **Lack of skills and knowledge about hydroponics and aquaponics and.** There is a general lack of skills in this area and therefore it is likely that the Proponent will source employees from outside Keetmanshoop.
- **Effects on reptile, amphibian and small mammal diversity.** The area is mostly inhabited by reptile, amphibian and small mammals. In comparison to other taxa such as insects, large mammals, fish and birds, reptile, amphibian and small mammals will be vulnerable to project activities due to their immobility. Certain activities during construction are expected to destroy habitats of reptiles and amphibians including destruction of their shelter as well as feeding, breeding, and nursing habitats. Additionally, even after their habitat are modified, these taxa may be attracted to greenhouses during the operation phase of the project as possible parasites or scavengers.
- **Theft and vandalism.** Theft of produces and damage to properties will be most likely; especially if the project does not get enough local support.

7.3. Evaluation of impacts

Many of the above impacts were moderately significant and only a few major. However, those that were major such as unemployment and lack of skills and knowledge were not due to the proposed project activities, though related. In terms of duration, many impacts were temporary and those impacts that were permanent such water consumption and were could be mitigated, for example by recycling water.

Overall, the proposed project will have a low ecological footprint on the environment due to low water and energy consumption. In terms of income generation and employment creation, the proposed project will not make a significant impact because of the size and investment.

Table 7: prediction of impacts and their effects on VECs.

Impacts description	**Valued ecosystem component affected**
1. Effect on reptile, amphibian and small mammal diversity. The area is mostly inhabited by reptile, amphibian and small mammals.	Biodiversity and ecology.
2. Access Restrictions along the pipeline route Pipeline installation works including trenching. The pipeline installation works will temporarily restrict public land access to a relatively small area.	Land, public health and public safety.
3. Water consumption and use. This likely to increase and the Proponent need a consent from Keetmanshoop to ascertain whether project water requirements.	Water resources.
4. Theft and vandalism. Theft of produces and damage to properties will be most likely; especially if the project does not get enough local support.	Income generation and employment opportunities.
5. Disruption to Road and Rail Users The B1 and B4 Roads will be the primary route used for the transportation of construction materials and workers residing outside the local communities resulting in traffic congestion. Construction vehicle movements will occur along the B1 and B4 Road and access roads may be established in the project area. Increased road traffic during the construction phase has the potential to disrupt communities and businesses along the routes used through increased noise and traffic flows. Road users may experience temporary disruption through increased traffic congestion, possible accidents, delays associated with the transport of oversized and heavy loads, and from damage to the physical condition of the roads.	Land, public health and public safety.
6. De-manning As the construction work progress to a different phase and at the point of peak employment, the construction contractor's workforce will need to be reduced. This can cause conflict and social interruption among the locals and this need to be mitigated.	Income generation and employment opportunities.
7. Lack of aquaponics and aquaculture. There a general lack of skills in this area and therefore it is likely that the Proponent will source employees from outside Keetmanshoop.	Social exclusivity.
8. Pegging marking where the project will be constructed is not done yet This will help members of the public to know how they will be affected by the proposed development.	Land.
9. Community Disturbance from the Visual Impact of the project The Project will include greenhouse and solar and this will add a different feature to the built environment of the town which was not there before.	Aesthetic value of land.

10. Increased Economic Flows The significant increase in local employment levels within the nearby communities that will occur during the construction phase may result in a rapid, temporary increase in local economic capital flows. While affected individuals and business owners will typically consider this to be a positive change, there is a potential for local inflation to occur through an increase in the demand for the same types of good and services. Business owners may also seek to maximize the local rise in household income by increasing prices to take full advantage of increased capital that becomes locally available.	Income generation and employment opportunities. Social-cultural disruption.
11. Social Conflicts There is the potential for conflict to occur from (perceived or actual) competition between individuals seeking jobs. Such conflicts could occur between members of the same settlement/ village, between individuals from the local communities/constituencies, or between 'local' and 'nonlocals'. Such conflicts may be exacerbated by pre-existing tensions between groups of people and in particular, between non-locals and vulnerable groups. In-migration may also place significant pressure on existing social infrastructure, including water demands.	Social-cultural disruption.
12. Dust and noise During construction dust and noise generated will affect people near-by the area	Public health.

Table 8: sensitivity of environmental resources.

IMPACTS	CLIMATE, LAND AND WATER RESOURCES			BIODIVERSITY RESOURCES	HUMAN ENVIRONMENT				
SENSITVITY RATING 1 Negligible 2 Low 3 Medium 4 High 5 Very high	i. Air quality	ii. Soil and land	iii. Water resources	iv. Biodiversity and ecology	v. Income generation and employment opportunities	vi. Public health and public safety	vii. Social exclusivity	viii. Aesthetic value of land	ix. Social-cultural disruption
1. Water consumption and use									
2. Employment among locals									
3. Lack of skills and knowledge about hydroponics and aquaponics									
4. Effects on diversity of reptile, amphibia and small mammals									
5. Theft and vandalism									

6. De-manning									
7. Lack of skills and knowledge about aquaponics and horticulture									
8. Pegging marking where the project will be constructed is not done yet									
9. Community Disturbance from the Visual Impact of the project									
10. Increased Economic Flows									
11. Social Conflicts									
12. Dust and noise									

Table 9: magnitude.

IMPACTS	CLIMATE, LAND AND WATER RESOURCES			BIODIVERSITY RESOURCES	HUMAN ENVIRONMENT				
0 No observable impact 1 Low impact 2 Tolerable impact 3 Medium high impact 4 High impact 5 Very high impact	i. Air quality	ii. Soil and land	iii. Water resources	iv. Biodiversity and ecology	v. Income generation and employment opportunities	vi. Public health and public safety	vii. Social exclusivity	viii. Aesthetic value of land	ix. Social-cultural disruption
1. Water consumption and use									
2. Employment among locals									
3. Lack of skills and knowledge about hydroponics and aquaponics									
4. Effects on diversity of reptile, amphibia and small mammals									
5. Theft and vandalism									
6. De-manning									
7. Lack of skills and knowledge about aquaponics and horticulture									

8. Pegging marking where the project will be constructed is not done yet									
9. Community Disturbance from the Visual Impact of the project									
10. Increased Economic Flows									
11. Social Conflicts									
12. Dust and noise									

Table 9: Duration.

IMPACTS	CLIMATE, LAND AND WATER RESOURCES			BIODIVERSITY RESOURCES	HUMAN ENVIRONMENT				
T Temporary P Permanent	i. Air quality	ii. Soil and land	iii. Water resources	iv. Biodiversity and ecology	v. Income generation and employment opportunities	vi. Public health and public safety	vii. Social exclusivity	viii. Aesthetic value of	ix. Social-cultural disruption
1. Water consumption and use									
2. Employment among locals									
3. Lack of skills and knowledge about hydroponics and aquaponics									
4. Effects on diversity of reptile, amphibia and small mammals									
5. Theft and vandalism									
6. De-manning									
7. Lack of skills and knowledge about aquaponics and horticulture									
8. Pegging marking where the project will be constructed is not done yet									
9. Community Disturbance from the Visual Impact of the project									

10. Increased Economic Flows									
11. Social Conflicts									
12. Dust and noise									

Table 9: Geographical coverage.

IMPACTS	CLIMATE, LAND AND WATER RESOURCES			BIODIVERSITY RESOURCES	HUMAN ENVIRONMENT				
L Localized impacts or limited to location O Impact of importance to municipality R Regional impacts N National impact I International	i. Air quality	ii. Soil and land	iii. Water resources	iv. Biodiversity and ecology	v. Income generation and employment opportunities	vi. Public health and public safety	vii. Social exclusivity	viii. Aesthetic value of land	ix. Social-cultural disruption
1. Water consumption and use									
2. Employment among locals									
3. Lack of skills and knowledge about hydroponics and aquaponics									
4. Effects on diversity of reptile, amphibia and small mammals									
5. Theft and vandalism									
6. De-manning									
7. Lack of skills and knowledge about aquaponics and horticulture									
8. Pegging marking where the project will be constructed is not done yet									

9. Community Disturbance from the Visual Impact of the project									
10. Increased Economic Flows									
11. Social Conflicts									
12. Dust and noise									

Table 9: Probability.

IMPACTS	CLIMATE, LAND AND WATER RESOURCES			BIODIVERSITY RESOURCES	HUMAN ENVIRONMENT				
LP **Low** probability (possibility of impact occurring is low, below 25%). P **Probable** (there is a distinct possibility that it will occur, approximately 50%). HP **Highly probable** (the impact is most likely to occur, 75%). D **Definite** (the impact will occur, 100%).	i. Air quality	ii. Soil and land	iii. Water resources	iv. Biodiversity and ecology	v. Income generation and employment opportunities	vi. Public health and public safety	vii. Social exclusivity	viii. Aesthetic value of land	ix. Social-cultural disruption
1. Water consumption and use									
2. Employment among locals									
3. Lack of skills and knowledge about hydroponics and aquaponics									
4. Effects on diversity of reptile, amphibia and small mammals									
5. Theft and vandalism									
6. De-manning									

7. Lack of skills and knowledge about aquaponics and horticulture									
8. Pegging marking where the project will be constructed is not done yet									
9. Community Disturbance from the Visual Impact of the project									
10. Increased Economic Flows									
11. Social Conflicts									
12. Dust and noise									

Table 9: Significance.

IMPACTS	CLIMATE, LAND AND WATER RESOURCES			BIODIVERSITY RESOURCES	HUMAN ENVIRONMENT				
Major 5/5 Moderate 4/5 Minor 2/5 None 1/1	i. Air quality	ii. Soil and land	iii. Water resources	iv. Biodiversity and ecology	v. Income generation and employment opportunities	vi. Public health and public safety	vii. Social exclusivity	viii. Aesthetic value of land	ix. Social-cultural disruption
1. Water consumption and use									
2. Employment among locals									
3. Lack of skills and knowledge about hydroponics and aquaponics									
4. Effects on diversity of reptile, amphibia and small mammals									
5. Theft and vandalism									
6. De-manning									
7. Lack of skills and knowledge about aquaponics and horticulture									
8. Pegging marking where the project will be constructed is not done yet									

9. Community Disturbance from the Visual Impact of the project									
10. Increased Economic Flows									
11. Social Conflicts									
12. Dust and noise									

8. DISCUSSIONS AND RECOMMENDATIONS

Extreme harsh climatic conditions in the area pose a critical threat to water, soils, land, and biodiversity. Local people depend directly on these critical resources for survival and without these their livelihood is impossible. The past difficult climatic conditions including low average rainfall had forced people to adapt other ways of living. Consequently, there is an observed change, locally, from a livelihood strategy dependent on farming and natural resources harvesting to a livelihood strategy which depend on other sectors such as agriculture, tourism and mining. It is possible that this paradigm shift in livelihood strategies could have impacts (both negative and positive) on the environment. While the need to diversify and venture into other economic activities exist as traditional farming is no longer working, it is important at the same time to document and monitor environmental impacts of these new activities.

The proposed plan to develop the aquaponic farm will enable the proponent to generate revenues for the Keetmanshoop community. However, this proposed development should be done in line with principles of sustainable development, international best practices and indeed relevant Namibian environmental laws and policies.

Therefore, based on the above, the ECC should be granted on the conditions that:

- The proponent develops an environmental monitoring plan as part of the EMP, which should be prepared and submitted prior to commencement of construction activities;
- A dedicated baseline monitoring survey (focusing on grasses, reptiles, insects and amphibians) should be conducted before construction to establish baseline conditions;
- A follow up monitoring survey (focusing more on grasses, reptiles, insects and amphibians) should be conducted during construction to monitor activities and mitigate negative impacts, and
- Monitoring of noise, waste, biodiversity and livelihood of local residents should be conducted during the operation phase.

REFERENCES

FAO. (n.d.). (2016). New Chilean regulations limit salmon supply growth | GLOBEFISH | Food and Agriculture Organization of the United Nations. Retrieved December 15, 2020, from 2016.

GRN (Government of the Republic of Namibia) (1990). The Constitution of the Republic of Namibia. Government of the Republic of Namibia, Namibia.

GRN (Government of the Republic of Namibia) (1996) Nature Conservation Amendment Act (Act 5 of 1996). Government Gazette No. 1333, 17th June 1996. Office of the Prime Minister, Namibia.

GRN (Government of the Republic of Namibia) (2007). Environmental Management Act (Act 7 of 2007). Government Gazette No. 3966, 27th December 2007. Office of the Prime Minister, Namibia. GRN (Government of the Republic of Namibia) (2013). Water Resources Management Act 11 of 2013. Office of the Prime Minister, Namibia.

Ministry of Environment & tourism (MET) (2012) Environmental Impact Assessment Regulations: Environmental Impact Management Act of 2007 (Act 7 of 2007). Government Gazette No. 48787, 6th February 2012. Ministry of Environment & Tourism, Namibia.

Namibia 2011 - Population and Housing Census Main Report. Namibia Statistics Agency.

Appendix 1

Placement of advertisements in the local print media:

CONFIDENTE | lifting the lid

03 February - 09 February 2023

Contact: Ms Fransina Frederick
• T: 061 24 6136 • C: 081 231 7332 • E: fransina@confidentenamibia.com

CALL FOR PUBLIC PARTICIPATION

NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT FOR THE DEVELOPMENT OF A SERVICE STATION ON ERF 268 OTJIMBINGWE

Notice is hereby given to all potential interested and Affected Parties (I&APs) that an application is made to the Environmental Commissioner in terms of the Environmental Management Act (No.7 of 2007) and the Environmental Impact Assessment Regulations (GN 30 in GG 4879 of 6 February 2012) for the following:

ENVIRODU CONSULTING & TRAINING SOLUTIONS CC

PUBLIC PARTICIPATION/ENVIROMENTAL IMPACT ASSESSMENT FOR THE PROPOSED AQUAPONIC GREENHOUSE FARMING WITH COMPLETE SOLAR PLANT IN KEETMANSHOOP, //KARAS REGION, NAMIBIA

BRUKKAROS HYDROPONIC FARMING CC (Or the Proponent) intends to construct and operate an Aquaponic Greenhouse Farming with complete Solar Plant at a site (Plot no. 2290) located in Keetmanshoop, //Karas Region, Namibia. The appointed Consultant would like to notify the public in terms of the Environmental Management Act (No. 7 of 2007) and its Regulations of 2012 that application for an Environmental Clearance Certificate (ECC) will be launched with the Environmental Commissioner/ Ministry of Environment, Forestry and Tourism.

APPOINTED CONSULTANT: The Proponent has appointed **ENVIRODU CONSULTING & TRAINING CC** to submit on their behalf the application for ECC.
INVITATION TO PARTICIPATE: Interested & Affected Parties (I & APs) are notified to register in order to participate in the public participation process. Only registered I & APs will be involved in the public consultation process.
In order to receive information about this project, kindly register as I & APs by contacting:

Mr. Michael Mateus
Envirodu Consulting & Training Solutions cc
P. O. Box 4120, Swakopmund
Email: michaelndinomwene@gmail.com
Mobile: +264 812989258

CONFIDENTE | lifting the lid

27 January - 02 february 2023

Contact: Ms Fransina Frederick
• T: 061 24 6136 • C: 081 231 7332 • E: fransina@confidentenamibia.com

CALL FOR PUBLIC PARTICIPATION

ENVIRODU CONSULTING & TRAINING SOLUTIONS CC

PUBLIC PARTICIPATION/ENVIROMENTAL IMPACT ASSESSMENT FOR THE PROPOSED AQUAPONIC GREENHOUSE FARMING WITH COMPLETE SOLAR PLANT IN KEETMANSHOOP, //KARAS REGION, NAMIBIA

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PUBLIC NOTICE:

Confidente Newspaper adverts– 27 January and 03 March 2023

NATIONAL NEWS

B2Gold Targets

24,000 tonnes per year and reduce heavy fuel oil consumption by an average 7.6 million liters per year. Construction of the Fekola solar plant expansion project is expected to begin in the third quarter of 2023 and is estimated to be complete in the third quarter of 2024".

Since 2016, B2Gold has reported annually on climate risk management in its responsible mining report and in 2021 the company released its inaugural climate strategy report.

Greenhouse gas emissions are divided into three categories for businesses and organisations – Scope 1, Scope 2 and Scope 3. Dividing emissions into three groups is intended to help measure progress in making the huge reductions that are needed to limit global temperature rises to well below 2°C – the central aim of the Paris Agreement.

Companies will need to cut emissions across all three scopes to meet internationally agreed targets on global warming. Scope 3 emissions are usually the hardest to measure and tackle, as they cover those produced by customers using the company's products.

As per the Paris Agreement, Scope 1 emissions are "direct" emissions – those that a company causes by operating the things that it owns or controls. These can be a result of running machinery to make products, driving vehicles, or just heating buildings and powering computers.

While Scope 2 emissions are "indirect" emissions created by the production of the energy that an organisation buys. Installing solar panels or sourcing renewable energy rather than using electricity generated using fossil fuels would cut a company's Scope 2 emissions.

B2Gold is a low-cost international senior gold producer headquartered in Vancouver, Canada. Founded in 2007, today, B2Gold has operating gold mines in Namibia, Mali and the Philippines and numerous exploration and development projects in various countries including Mali, Colombia, Finland and Uzbekistan. B2Gold forecasts total consolidated gold production of between 1 000 000 and 1 080 000 ounces in 2023.

"As a company, B2Gold recognises that climate change is a critical global challenge and understands that it must act accordingly. B2Gold has been an innovative leader within the mining industry with respect to the management of sustainability issues and this commitment to GHG emissions reduction forms a key part of our Climate Strategy, incorporating climate management as a part of its business strategy and planning process."

ECUTS

PUBLIC PARTICIPATION/ENVIROMENTAL IMPACT ASSESSMENT FOR THE PROPOSED AQUAPONIC GREENHOUSE FARMING WITH COMPLETE SOLAR PLANT IN KEETMANSHOOP, //KARAS REGION, NAMIBIA

BRUKKAROS HYDROPONIC FARMING CC (Or the Proponent) intends to construct and operate an Aquaponic Greenhouse Farming with complete Solar Plant at a site (Plot no. 2290) located in Keetmanshoop, //Karas Region, Namibia. The appointed Consultant would like to notify the public in terms of the Environmental Management Act (No. 7 of 2007) and its Regulations of 2012 that application for an Environmental Clearance Certificate (ECC) will be launched with the Environmental Commissioner/Ministry of Environment, Forestry and Tourism.

APPOINTED CONSULTANT: The Proponent has appointed **ENVIRODU CONSULTING & TRAINING CC** to submit on their behalf the application for ECC.

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Email: michaelndinomwene@gmail.com

Mobile: +264 812989258

The Villager 4

NATIONAL NEWS

MTC Switches

and an economic imperative.
Mushelenga said MTC's continuous investment in telecommunication will bring people and eliminate the information gaps between rural and urban, rich and poor, privileged and the disadvantaged.

Cementing the minister's sentiments, MTC managing director Licky Erastus announced that the Okadhiya tower, although located in a rural setting, is 4G enabled and can be upgraded to 5G in the near future.
"Under the 081Every1 project, our sites have been upgraded from 2G to 3G and 4G, respectively," Erastus pointed out.

He said the upgrading of towers to the latest broadband cellular network technology is aiming to unlock Namibians to digitalisation.

"We want our people, regardless of where they are, to be digitally enabled and have access to e-services."
Erastus revealed that very soon MTC will be setting in motion the rollout of 5G technology so that the country upscale and ready the economy for the Fourth Industrial Revolution (4IR).

Erastus added that the execution of the company's mandate of providing inclusive and quality connectivity, commissioning a network tower is always fulfilling, as they intentionally lead and drive to bridge the digital gap in society.
He said MTC
\believes that in order for the telecommunication player to ensure sheer inclusivity and equal economic participation of all citizens, the extension of network footprints to all corners of the country is essential.

Email: erastus@thevillager.com.na

ECUTS

PUBLIC PARTICIPATION/ENVIROMENTAL IMPACT ASSESSMENT FOR THE PROPOSED AQUAPONIC GREENHOUSE FARMING WITH COMPLETE SOLAR PLANT IN KEETMANSHOOP, //KARAS REGION, NAMIBIA

BRUKKAROS HYDROPONIC FARMING CC (Or the Proponent) intends to construct and operate an Aquaponic Greenhouse Farming with complete Solar Plant at a site (Plot no. 2290) located in Keetmanshoop, //Karas Region, Namibia. The appointed Consultant would like to notify the public in terms of the Environmental Management Act (No. 7 of 2007) and its Regulations of 2012 that application for an Environmental Clearance Certificate (ECC) will be launched with the Environmental Commissioner/Ministry of Environment, Forestry and Tourism.

APPOINTED CONSULTANT: The Proponent has appointed **ENVIRODU CONSULTING & TRAINING CC** to submit on their behalf the application for ECC.

INVITATION TO PARTICIPATE: Interested & Affected Parties (I & APs) are notified to register in order to participate in the public participation process. Only registered I & APs will be involved in the public consultation process.

In order to receive information about this project, kindly register as I & APs by contacting:

Mr. Michael Mateus

Envirodu Consulting & Training Solutions cc

P. O. Box 4120, Swakopmund

Email: michaelndinomwene@gmail.com

Mobile: +264 812989258

The Villager 5

The Villager Newspaper adverts –27 January and 03 March 2023

Appendix 2

An invitation form that was attached to a background information document (BID) for I&APs to register in order to attend the meeting as well as explain their issues of concerns.

ENVIRODU CONSULTING & TRAINING SOLUTIONS CC website: www.ecutsnamibia.com

Mobile: +264 816343170 **Email:** michaelndinomwene@gmail.com

Title:	
First name(s):	
Surname:	
Organisation/Affiliation:	
Profession:	
Contact number:	
Email:	
I would like to attend the public meeting	

Comments:	Please list and explain issues of concerns here …… …… …… …… …… …… …… …… …… …… …… …… ……

Appendix 3

Placement of an on-site notice and public outlets notice boards – Keetmanshoop Multipurpose and Youth Center, Town Center and the distribution of small Flyers to the community.

BRUKKAROS
Hydroponic Farming (Pty) Ltd
Superior Organic | Locally Grown | Feeding the Nation.

ECUTS
Envirodu Consulting & Training Solutions cc

PUBLIC NOTICE

SCOPING ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED AQUAPONIC GREENHOUSE FARMING WITH COMPLETE SOLAR PLANT IN KEETMANSHOOP, //KARAS REGION, NAMIBIA

BRUKKAROS HYDROPONIC FARMING (PTY) Ltd (Or "the Proponent") intends to construct and operate an Aquaponic Greenhouse Farming "URBAN FARM" with complete Solar Plant at a site (Plot no. 2290) located in Keetmanshoop, //Karas Region, Namibia.

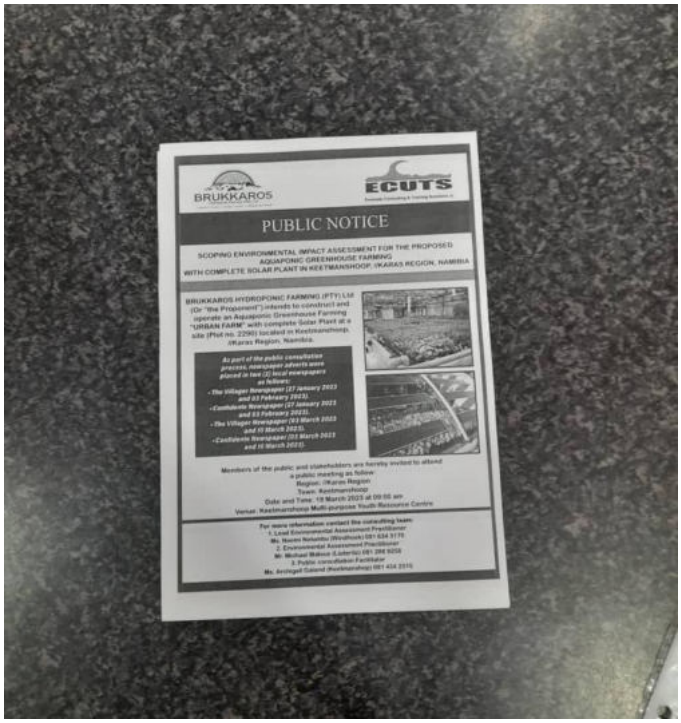
As part of the public consultation process, newspaper adverts were placed in two (2) local newspapers as follows:

- ***The Villager Newspaper (27 January 2023 and 03 February 2023).***
- ***Confidente Newspaper (27 January 2023 and 03 February 2023).***
- ***The Villager Newspaper (03 March 2023 and 10 March 2023).***
- ***Confidente Newspaper (03 March 2023 and 10 March 2023).***

Members of the public and stakeholders are hereby invited to attend a public meeting as follow:
Region: //Karas Region
Town: Keetmanshoop
Date and Time: 18 March 2023 at 09:00 am
Venue: Keetmanshoop Multi-purpose Youth Resource Centre

For more information contact the consulting team:
1. Lead Environmental Assessment Practitioner
Ms. Naemi Nelumbu (Windhoek) 081 634 3170
2. Environmental Assessment Practitioner
Mr. Michael Mateus (Lüderitz) 081 298 9258
3. Public consultation Facilitator
Ms. Archigail Galand (Keetmanshop) 081 434 2515

Posters that were pasted at the Keetmanshoop Multipurpose and Youth Center and town center to notify the community of the public meeting.



The small flyers that were randomly distributed to the Keetmanshoop community people.

CURRICULUM VITAE OF PROJECT ADMINISTRATOR (PA)/ENVIRONMENTAL PRACTITIONER (EAP)

Name of Consultant: Naemi Nelumbu
Profession: Project Administrator
Date of Birth: 13 July 1995

Age: 28

Nationality: Namibian

Key Profile:

Ms. Naemi Nelumbu's multiple skills are invaluable to ECUTS in providing both administrative and project management support to all Services listed under ECUTS' Founding Statement. She is able to do this due to her numerous qualifications in 3 key disciplines viz. environmental management, education/training and fisheries management. Ms. Nelumbu holds a Degree (with Honours) in Fisheries and Aquatic Sciences (University of Namibia, 2018); a Postgraduate Diploma in Environmental Management (University of Stellenbosch, 2018) and a Postgraduate Diploma in Education (International University of Management, 2020). She is currently pursuing her Degree Master of Philosophy in Environmental Management (Stellenbosch University). From 2020 until now, she has been consulting on behalf of ECUTS both as a Project Administrator and an Environmental Assessment Practitioner. She has provided various project services and supported project activities including public facilitations, communication engagements with external stakeholders and Government Entities as well as travel logistic support to regional and international Consultants. She has contributed to compilations of Environmental Impact Assessment and Environmental Management Plan Reports leading to approval of ECCs for projects of higher impacts and value.

Education:

Table 1: Formal qualifications.

Qualification/Duration	Subject/major/thesis title/institution

Postgraduate Diploma in Environmental Management	Development Planning and Environmental Analysis. **Stellenbosch University**
Postgraduate Diploma in Education	**Major:** Biology and Physical Science. **International University of Management**
Bachelor of Science in Fisheries & Aquatic Sciences (Honours) (2014-2017)	Trace metal concentration in the Walvis Bay Lagoon. **University of Namibia**

Table 2*:* Continuous skills and capacity development.

Skills and competencies	**Institution**	**Qualification**	**Completion Date**
Introduction to Marine Biofouling: Impacts and Management of Risks eLearning Course.	International Maritime Organisation	Certificate of Attendance: *Marine Biofouling: Impacts and Management of Risks eLearning Course.*	June 2023
Teach for Education for Sustainable Development (ESD)	Namib Desert Environmental Education Trust (NaDEET)	Certificate of participation: Improving ESD teaching and learning experience in Namibia	2021-2022

Employment Record:

2019 to present ENVIRODU CONSULTING & TRAINING SOLUTIONS CC as Project Administrator/Environmental Assessment Practitioner
Responsible for coordinating project activities, managing schedules, follow up on status of ECCs and ensure Government Entities delivers on approvals of ECCs and other environmental certificates/licences. Support project activities, analyse risks and provide documentations. Support travel logistics to regional and international Consultants.

2019 to present Monica Geingos Secondary School as a Teacher
Responsible for teaching Biology, Physics and Life Science as well as co-ordination and facilitation of a school Environmental Club.

Language:	Speaking	Reading	Writing
English	Good	Good	Good
Oshiwambo	Good	Good	Good
Afrikaans	Fair	Fair	Poor
Khoekhoegowab	Fair	Poor	Poor

Certification:
I, the undersigned, certify that to the best of knowledge and belief, these data correctly describe me, my qualification and experience.

Date: 05 June 2023

Naemi Nelumbu

CURRICULUM VITAE OF ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)/BASELINE ENVIRONMENTAL ASSESSMENT

Name of Consultant:	Michael Ndinomwene Mateus
Profession:	Environmental Assessment Practitioner
Date of Birth:	06 September 2000
Age:	23
Nationality:	Namibian

Key Qualifications:

Michael Ndinomwene Mateus *has experience in environmental impact assessment, impacts mitigation, monitoring and mapping using GIS (Geographical Information Systems). This is backed up by his Degree (with Honours) in Fisheries and Aquatic Sciences (University of Namibia, 2022). Mr. Mateus comes handy when it comes to GIS as well as baseline biodiversity assessments. For his current studies, Master of Science in Fisheries and Aquatic Sciences (University of Namibia, 2023), he is using Remote Sensing to quantify the amount of Carbon being produced by the giant kelp at a local farm (Kelp Blue Farm, Lüderitz). Mr. Mateus has passion for protecting the environment, improve air quality and carbon sequestration. He completed online course on biofouling prevention, detection and management with the International Maritime Organization. Mr. Michael was part of the Namibia Marine Ecosystem Services project (NAMares) for Marine Spatial Planning (MSP) as well as part of a number of projects done by the Envirodu Consulting and Training Solutions team and they have successfully delivered ECCs granting permissions for various sustainable development projects inland, along the coast and within the marine and offshore environments.*

Education:

Table 1: Formal qualifications.

Qualification/Duration	**Thesis title/University**
Master of Science in Fisheries & Aquatic Sciences (2023 - current) (**Specialization:** *Carbon sequestration*).	"Estimation of the net primary production of giant kelp *(macrocystis pyrifera)* at the Kelp Blue shearwater bay farm in Luderitz, Namibia" "**University Of Namibia"**.
Introduction to Marine Biofouling: Impacts and Management of Risks. (**Specialization:** *Marine and coastal environment management and protection*).	(eLearning Course) "**International Maritime Organization"**
Bachelor of Science in Fisheries & Aquatic Sciences (Honours) (2019 – 2022) (**Specialization:** Ocean, Coast and *Fisheries Management and Marine Sciences*).	"Optimization of oregano as a potential anaesthetic in tilapia (*Oreochromis andersonii*) fingerlings culture". **"University of Namibia**".

Table 2: Continuous skills and capacity development.

Skills and competencies	**Institution**	**Qualification**	**Completion Date**
Introduction to Marine Biofouling: Impacts and Management of Risks. (**Specialization:** *Marine and coastal environment management and protection*).	(eLearning Course) "**International Maritime Organization"**	Introduction to Marine Biofouling: Impacts and Management of Risks. (**Specialization:** *Marine and coastal environment management and protection*).	(eLearning Course) "**International Maritime Organization"**

Employment Record:

2022 to present, **Envirodu Consulting & Training Solutions cc** – *Environmental Assessment Practitioner*

Environmental planning and development analysis (SEAs, EIAs, EMPs, Social Impact Analysis, Sustainability Analysis); baseline studies; ecosystem/biodiversity assessments; maritime pollution and monitoring; project scoping and administration.

Language:

	Speaking	**Reading**	**Writing**
English	Good	Good	Good
Oshiwambo	Good	Good	Good
Afrikaans	Fair	Fair	Fair

Certification:

I, the undersigned, certify that to the best of knowledge and belief, these data correctly describe me, my qualification and experience.

Date: 02 June 2023

Michael Ndinomwene Mateus